

Prüfbericht-Nr.: Test Report No.:	50335222 001	Auftrags-Nr.: Order No.:	168142859	Seite 1 von 26 Page 1 of 26
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	05.12.2019	
Auftraggeber: Client:	Visteon Corporation One Village Center Drive, Van Buren Township, MI, 48111, USA			
Prüfgegenstand: Test item:	VW FPK Basic 8 INSTRUMENT CLUSTER AND IMMOBILIZER SYSTEM			
Bezeichnung / Typ-Nr.: Identification / Type No.:	FPK8 IMMO5D			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	CFR47 FCC Part15: Subpart C Section 15.209 RSS-Gen Issue 5 RSS-210 Issue 10			
Wareneingangsdatum: Date of receipt:	08.01.2020			
Prüfmuster-Nr.: Test sample No.:	A001052120-001			
Prüfzeitraum: Testing period:	15.01.2020 - 25.02.2020			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	PASS			
geprüft von / tested by:		kontrolliert von / reviewed by:		
05.03.2020 Hardy Suo / Assistant Project Manager		05.03.2020 Sam Lin / Technical Certifier		
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges / Other:				
FCC ID: NT8-FPK8IMMO5D				
IC: 3043A-FPK8IMMO5D				
HVIN: PWB24979				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				



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TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass
5.1.2 SPURIOUS EMISSION
RESULT: Pass
5.1.3 99% BANDWIDTH
RESULT: Pass

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendixes:
None.

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2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd. (A2LA Certificate Number: 5162.01)

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Accreditation Designation No.: CN1260

ISED Wireless Device Testing Laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equip. No.	Equipment	Manufacturer	Model	Serial No.	Cal. until
1826021	EMI Test Receiver	R&S	ESR 7	102021	2020-08-19
1826023	Signal Analyzer	R&S	FSV 40	101439	2020-08-21
1826024	System Controller Interface	R&S	SCI-100	S10010038	N/A
1826025	Filterbank	R&S	Wlan	100759	2020-08-21
1826026	OSP	R&S	OSP 120	102040	N/A
1826028	Pre-amplifier	R&S	SCU08F1	08320031	2020-08-20
1826029	Amplifier	R&S	SCU-18F	180070	2020-08-20
1826030	Amplifier	R&S	SCU40A	100475	2020-09-20
1826031	Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2020-09-20
1826032	Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2020-09-20
1826033	Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2020-09-20
1826034	Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2020-09-01
1826035	Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2020-09-20
1826036	Test software	R&S	EMC32 (V10.50.40)	N/A	N/A
1826037	Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
1826433	3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2020-07-06

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

Table 2: Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 1 \times 10^{-7}$
3	Radiated Emission of Transmitter, valid up to 26.5 GHz	± 6 dB
4	Radiated Emission of Receiver, valid up to 26.5 GHz	± 6 dB
5	Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.52 dB
6	Radiated Emission (3m SAC), above 1000MHz	± 4.37 dB
7	Temperature	± 1 °C
8	Humidity	± 5 %
9	Voltage (DC)	± 1 %
10	Voltage (AC, <10kHz)	± 2 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached in this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a vehicular instrument VW FPK Basic 8 INSTRUMENT CLUSTER AND IMMOBILIZER SYSTEM (M/N: FPK8 IMMO5D) which that supports RFID 125 kHz wireless technology.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

Technical Specification	Value
Product Name	VW FPK Basic 8 INSTRUMENT CLUSTER AND IMMOBILIZER SYSTEM
Model	FPK8 IMMO5D
Brand Name	Visteon
FCC ID	NT8-FPK8IMMO5D
IC	3043A-FPK8IMMO5D
HVIN	PWB24979
Operating Frequency	125 kHz
Modulation	ASK
Antenna Number	1
Antenna Type	Air Coil
Antenna Gain	0dBi max
Operation Voltage	DC 13.5V ($\pm 0.2V$, Powered by battery)

Remark: FPK8 IMMO5D has three configurations which appear different appearance only, the PCBA, electricity and electronics are identical. Refer to document Attestation Letter of Appearance Difference for more details.

3.3 Independent Operation Modes

The basic operation modes are:

- A. Transmission
- B. Standby

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- | | |
|--------------------|----------------------|
| - Bill of Material | - Circuit Diagram |
| - PCB Layout | - Instruction Manual |
| - Photo Document | - Rating Label |

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested together with the following accessories:

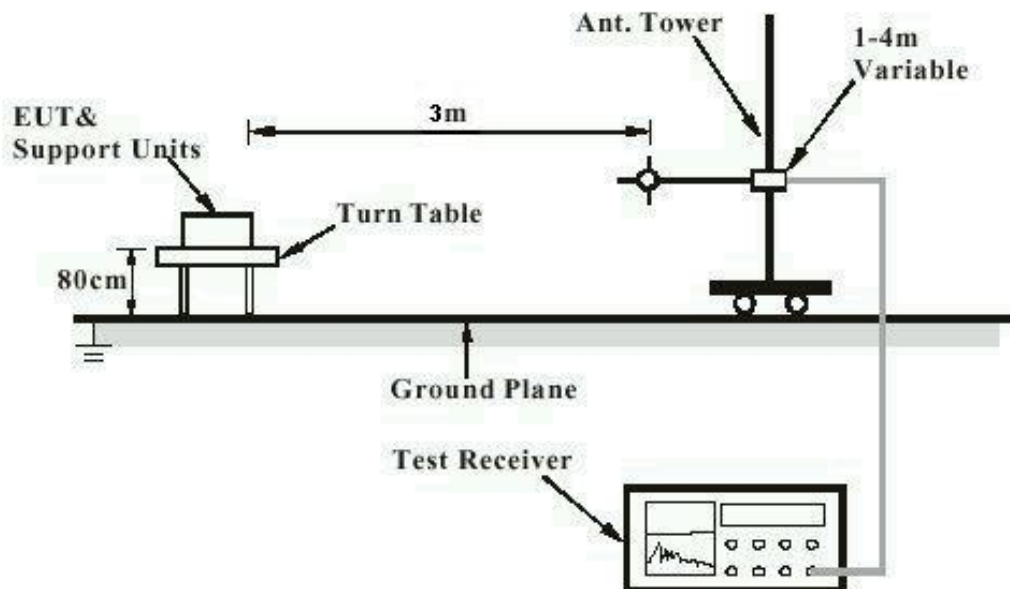
Description	Manufacturer	Model	S/N	Note
-	-	-	-	-

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard

FCC Part 15.203

RSS-Gen Clause 8.3

The EUT has an air coil antenna with gain 0 dBi max, and has a unique coupling to the intertional radiator. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Spurious Emission

RESULT:**Pass****Test Specification**

Date of testing	:	15.01.2020 - 25.02.2020
Test standard	:	FCC part 15.209
	:	RSS-210 Clause 7.3
Basic standard	:	ANSI C63.10: 2013
Limits	:	FCC part 15.209(a)
	:	RSS-Gen Clause 6.13
Kind of test site	:	3m Semi-Anechoic Chamber & Anechoic Chamber

Test setup

Test Channel	:	125 kHz
Operation mode	:	A
Ambient temperature	:	Refer to test plot
Relative humidity	:	Refer to test plot
Atmospheric pressure	:	101kPa

Test plot as below.

5.1.2.1 9 kHz – 30 MHz

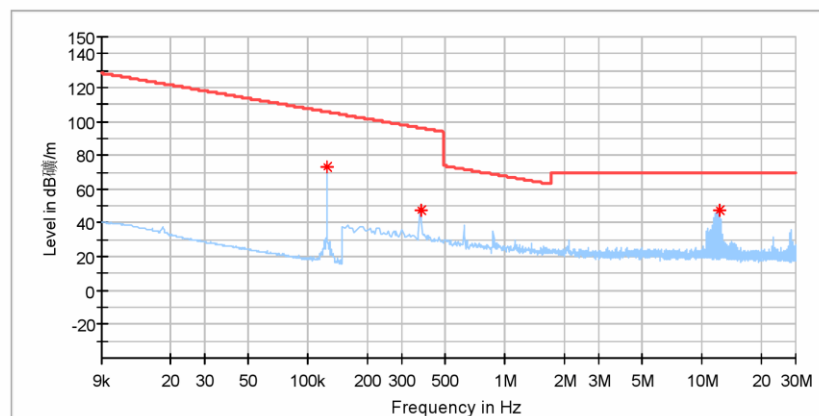
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: X
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin


Critical Freqs

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125124	73.44	105.66	32.22	100.0	V	155.0	20.0
0.373875	47.70	96.15	48.45	100.0	V	137.0	20.0
12.256809	47.46	69.54	22.08	100.0	V	4.0	20.0

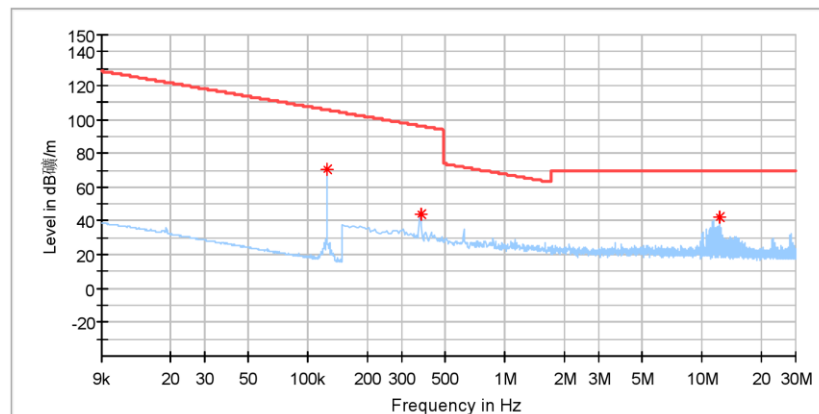
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: Y
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125124	70.87	105.66	34.78	100.0	V	180.0	20.0
0.373875	44.29	96.15	51.85	100.0	V	177.0	20.0
12.256809	42.02	69.54	27.52	100.0	V	4.0	20.0

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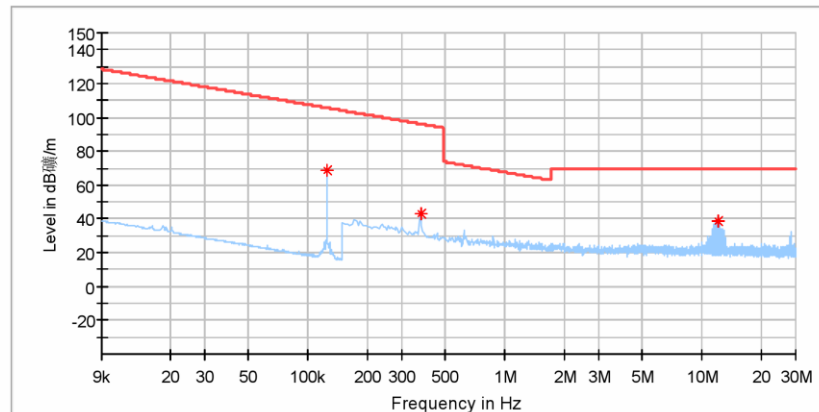
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: Z
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125124	68.75	105.66	36.91	100.0	V	180.0	20.0
0.373875	42.77	96.15	53.38	100.0	V	175.0	20.0
12.006596	38.87	69.54	30.67	100.0	V	180.0	20.0

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5.1.2.2 9 kHz – 90 kHz

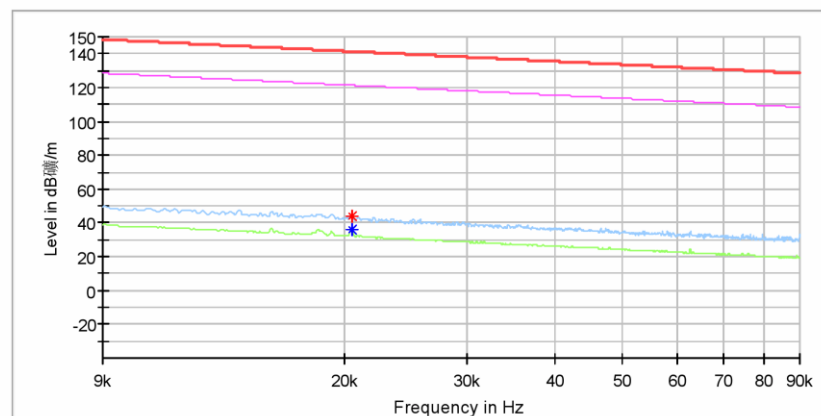
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: X
Test Voltage:	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.020456	---	35.82	121.39	85.57	100.0	V	0.0	20.0
0.020514	44.04	---	141.35	97.31	100.0	V	0.0	20.0

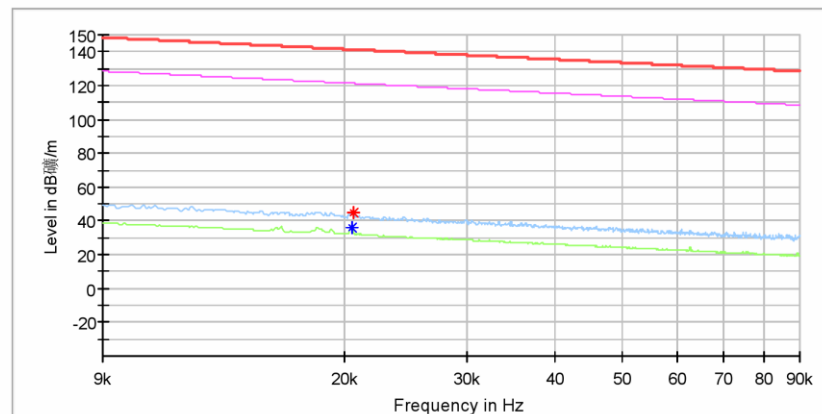
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: Y
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.020456	---	35.74	121.39	85.65	100.0	V	0.0	20.0
0.020571	44.70	---	141.32	96.63	100.0	V	0.0	20.0

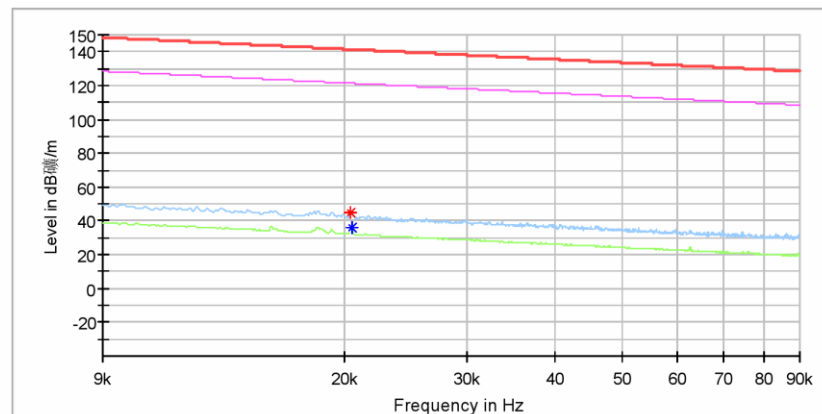
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: Z
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.020398	44.95	---	141.40	96.44	100.0	V	0.0	20.0
0.020456	---	36.07	121.39	85.31	100.0	V	0.0	20.0

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5.1.2.3 110 kHz – 490 kHz

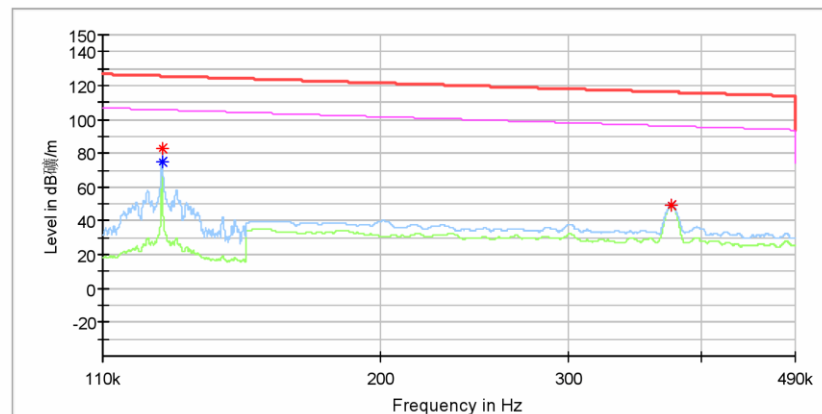
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: X
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125057	---	74.83	105.66	30.83	100.0	V	155.0	20.0
0.125057	83.06	---	125.66	42.59	100.0	V	155.0	20.0
0.375000	49.45	---	116.12	66.67	100.0	V	126.0	20.0
0.375050	---	48.92	96.12	47.20	100.0	V	126.0	20.0

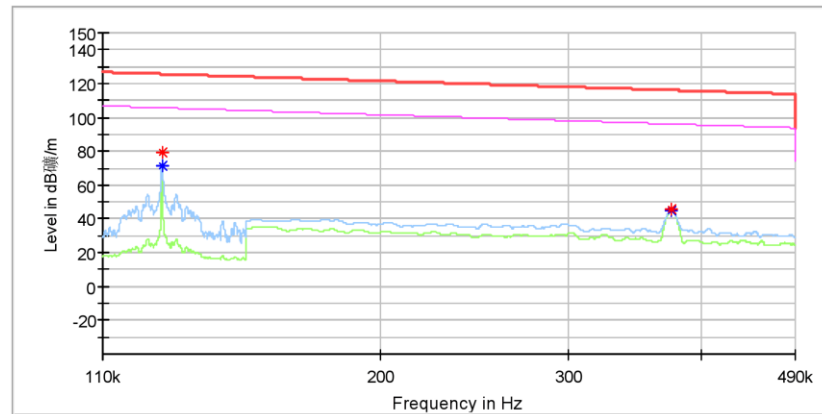
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: Y
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125057	79.32	---	125.66	46.34	100.0	V	180.0	20.0
0.125057	---	71.76	105.66	33.91	100.0	V	180.0	20.0
0.374950	---	45.07	96.13	51.05	100.0	V	178.0	20.0
0.375100	45.75	---	116.12	70.37	100.0	V	178.0	20.0

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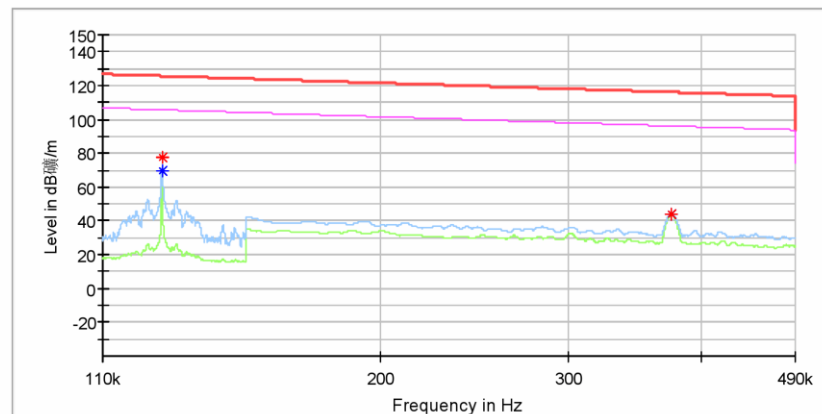
Test

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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX, ANT orientation: Z
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15C
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.125057	77.40	---	125.66	48.26	100.0	V	180.0	20.0
0.125057	---	69.82	105.66	35.84	100.0	V	180.0	20.0
0.375000	---	43.57	96.12	52.56	100.0	V	179.0	20.0
0.375000	44.16	---	116.12	71.96	100.0	V	179.0	20.0

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5.1.2.4 30 MHz – 1 GHz

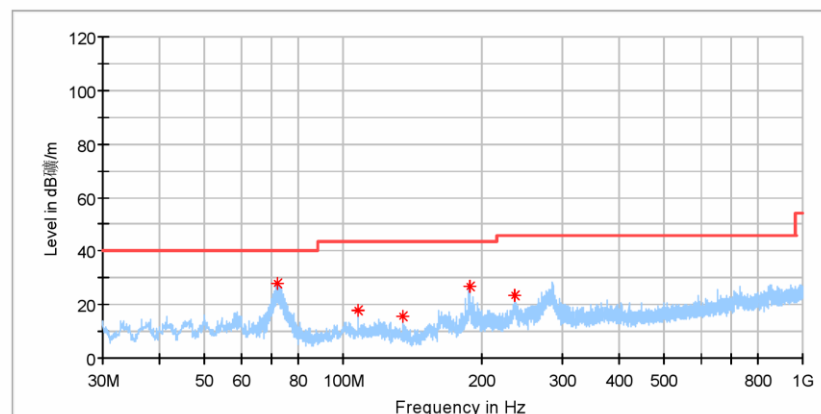
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Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX
Test Voltage:	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin


Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
71.710000	27.81	---	40.00	12.19	100.0	H	160.0	-22.7
107.745500	18.10	---	43.50	25.40	100.0	H	316.0	-19.3
134.711500	15.90	---	43.50	27.60	100.0	H	152.0	-22.4
188.595000	26.59	---	43.50	16.91	100.0	H	275.0	-20.0
235.979500	23.42	---	46.00	22.58	100.0	H	307.0	-18.2

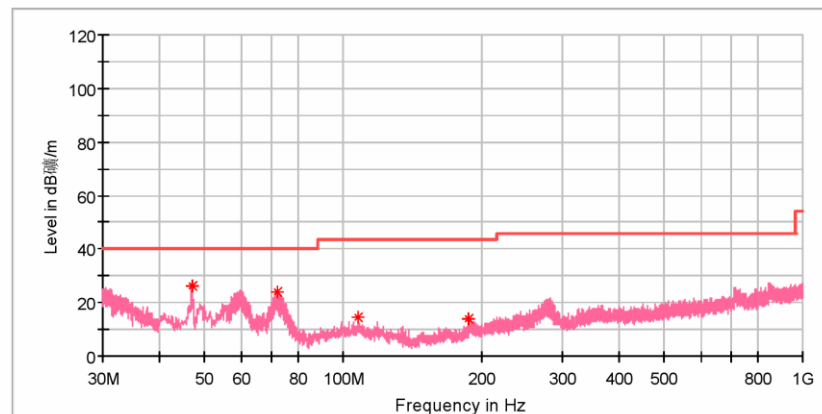
Test

1 / 1

Test Report

EUT Information

EUT Name:	Cluster
Model:	FPK 8 IMMO 5D
Test Mode:	TX
Test Voltage::	DC 13.5V From DC Source
Remark:	Temp 24 Humi:47%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
46.829500	26.00	---	40.00	14.00	100.0	V	111.0	-18.9
72.001000	24.13	---	40.00	15.87	100.0	V	266.0	-22.7
107.745500	14.27	---	43.50	29.23	100.0	V	78.0	-19.3
188.013000	14.19	---	43.50	29.31	100.0	V	127.0	-20.1

15/1/2020

11:11:30 AM

5.1.3 99% Bandwidth

RESULT:
Pass

Date of testing : 25.02.2020
 Test standard : RSS-Gen Clause 6.7
 Basic standard : ANSI C63.10: 2013
 Limits : --

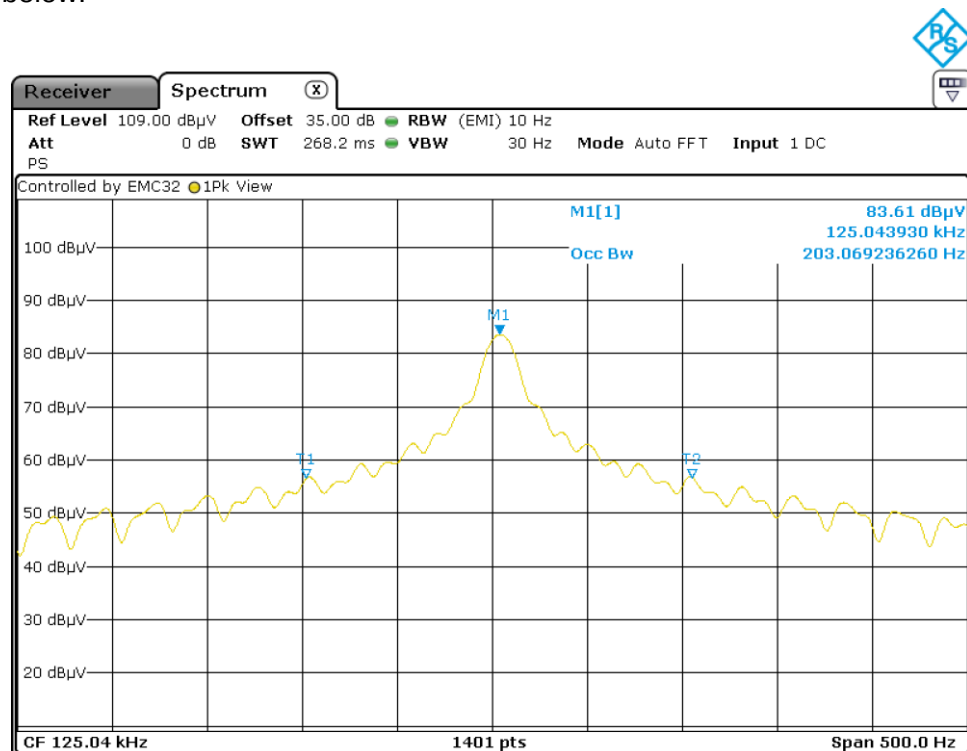
Kind of test site : 3m Semi-Anechoic Chamber & Anechoic Chamber

Test setup

Test Channel : 125 kHz
 Operation mode : A
 Ambient temperature : 20°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa

Test Frequency (kHz)	99% Bandwidth (Hz)
125	203.070

Test plot as below.



6. List of Tables

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